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64. *Certhia familiaris montana*. ROCKY MOUNTAIN CREEPER.—Common at 10,000 feet.

65. *Sitta carolinensis aculeata*. SLENDER-BILLED NUTHATCH.—Very common at 10,000 feet.

66. *Sitta canadensis*. RED-BREASTED NUTHATCH.—Common at 10,000 feet.

67. *Sitta pygmæa*. PYGMY NUTHATCH.—Very abundant between 7,000 and 10,000 feet.

68. *Parus inornatus griseus*. GRAY TITMOUSE.—Found sparingly at 8,000 feet.

69. *Parus gambeli*. MOUNTAIN CHICKADEE.—This, the most abundant of our Tits, is found at 10,000 feet and upwards.

70. *Parus atricapillus septentrionalis*. LONG-TAILED CHICKADEE.—Does not appear to be found above 8,500 feet.

71. *Psaltriparus plumbeus*. LEAD-COLORED BUSH-TIT.—Occurs only up to 7,800 feet.

72. *Myadestes townsendii*. TOWNSEND'S SOLITAIRE.—Common. Breeds at 9,500 feet.

73. *Turdus aonalaschkæ auduboni*. AUDUBON'S HERMIT THRUSH.—Tolerably common, breeding up to 10,000 feet.

74. *Merula migratoria propinqua*. WESTERN ROBIN.—Common at 8,000 feet.

75. *Sialia mexicana*. WESTERN BLUEBIRD.—Abundant. Breeds as high as 9,500 feet.

76. *Sialia arctica*. MOUNTAIN BLUEBIRD.—Common up to 10,000 feet.

THE YOUNG OF THE RED-SHOULDERED HAWK (*BUTEO LINEATUS*).

BY FRED. H. KENNARD.¹

ON MAY 26, 1889, I found two young birds of this species in a nest in a pine in West Roxbury, Mass. They were covered with down, and I judged them to be somewhere between two and three weeks old. I took one of them, the larger one, and on May 31, just five days later, I returned and took the other. The first one had his primaries, secondaries, tertiaries and

scapulars beginning to grow, and the quills of his wing-coverts, as well as those of his tail-feathers, were just beginning to appear.

The second bird, which I took to be a couple of days the younger, had, when I left him in his nest, barely a quill to be seen; when, however, I returned five days later, all the above mentioned feathers had become well started, and the wing-quills and scapulars were well along; while a few feathers had appeared in the interscapular region.

On June 12, 1893, I procured three young birds alive from another nest in Brookline, Mass. These birds by their subsequent growth proved to be about two days apart in age, and the youngest and smallest of them, which I took to be a male, and which I called 'Pete,' was but two or three days older than the larger specimen I procured in 1889. On this ground I calculated that these three birds must be between three and four weeks old, and probably hatched about the 15th of May; somewhat later than my 1889 birds were hatched.

The subjoined diagram, showing the chronology of the growth of the Hawk's feathers, is the result of the above data, my deductions and notes and measurements taken at the times stated. From June 12 I can guarantee them as accurate, while on the days previous to that they may be only approximate, owing to the uncertain data at hand. From June 12 I show what progress the oldest Hawk made, while previous to that, the lines and dates are made up from the observations on the other two younger Hawks, and from data referring to the two 1889 Hawks.

I called the 1893 Hawks 'Bute' (short for *Buteo*), 'Topsy' and 'Pete.' The first two were older than Pete, and I supposed them then, and from their growth later, to be females. Bute, when I got her, had all the feathers that I have spoken of with regard to the 1889 Hawks, well developed. Her back feathers were also well along and had spread upwards and downwards, and there were, too, quite a lot of feathers on her breast. During the week June 12-18, inclusive, all the rest of her feathers either got well under way, or appeared, as shown by the diagram.

Topsy proved at first, by accurate observation, to be exactly two days behind Bute in the growth of her feathers, though she

Presumably about two weeks old.

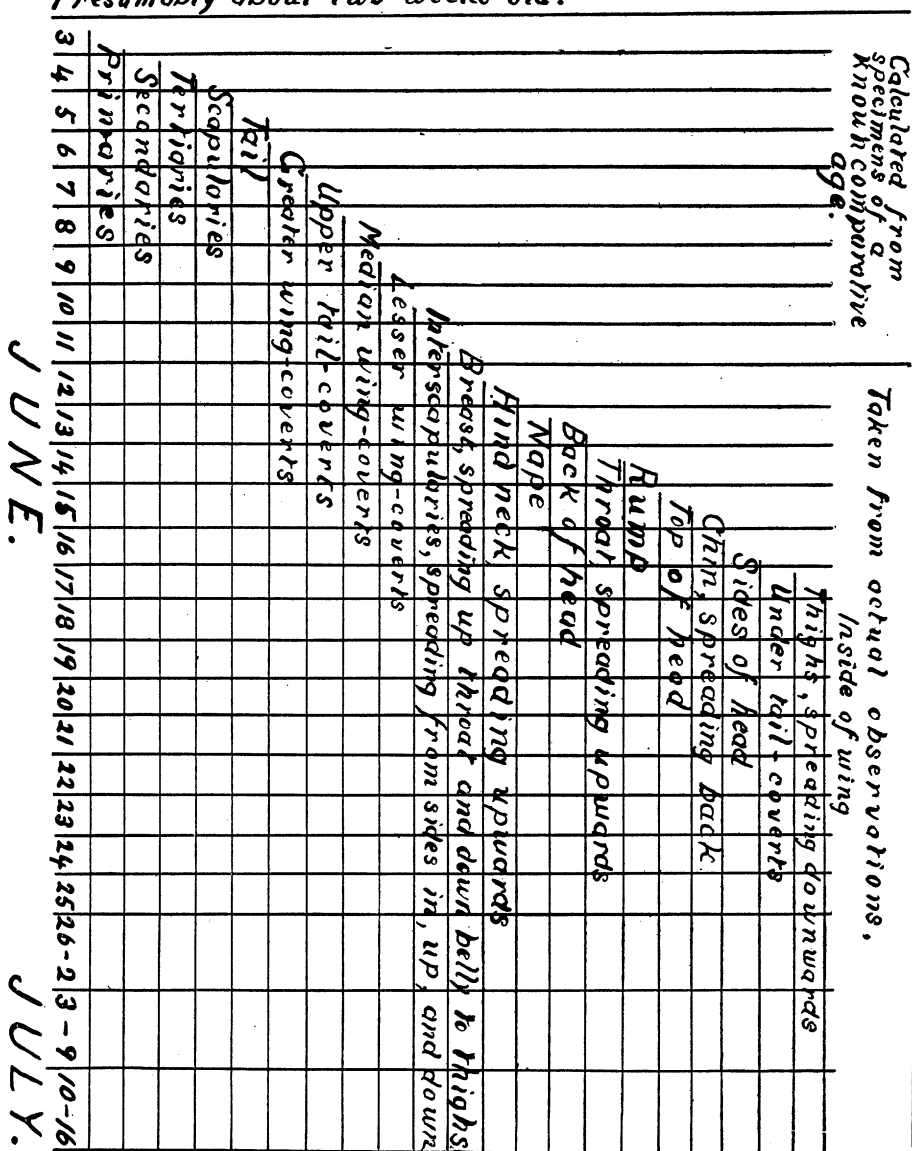


Diagram illustrating Growth of Feathers in Young Hawks.

caught up with her and even went ahead of her later. Pete was about two days behind Topsy when I found him; and though at one time he started to catch up, he finally dropped farther and farther behind.

As they grew, their feathers spread from the interscapular region upwards over the hind neck, nape, and back of the head, and at the same time backwards over the rump, towards the upper tail-coverts, which were already well grown. Their breasts, too, became more and more feathered, and these feathers spread upwards over their throats and chins, and the sides of their heads, as well as downwards over their bellies and sides, to meet their under tail-coverts, which had become well grown in the meantime. Almost the last parts to be covered were their thighs, which only became so when the growth on their bellies reached and extended down them. The growth under their wings, which came last, started at their finger tips and worked backwards towards their shoulders, finally meeting the growth on their sides.

The figures in the subsequent pages were calculated from measurements taken at certain intervals upon each Hawk. I measured their length from bill to tail; their extent from tip to tip; the length of the fourth primary, and of the middle tail-feather. From these measurements I could easily compute the growth of each Hawk per day, as well as the average growth of the three, which is also shown.

TABLES SHOWING GROWTH IN THREE YOUNG RED-SHOULDERED
HAWKS.¹

<i>Name.</i>	<i>Date.</i>	<i>Length.</i>	<i>Extent.</i>	<i>4th Primary.</i>	<i>Tail-feathers.</i>
Bute,	June 12, 1893, 4 P.M.	12.00	26.00	4.00	2.50
Topsy,	" " " "	12.00	26.00	4.00	2.25
Pete,	" " " "	12.00	22.00	3.00	1.75
Bute,	" 14, " "	12.75	27.00	4.75	3.00
Topsy,	" " " "	12.75	26.50	4.37	2.87
Pete,	" " " "	11.75	23.50	4.00	2.25
Bute,	" 16, " 1 P.M.	13.50	28.50	5.50	3.50
Topsy,	" " " "	13.75	28.50	4.75	3.25
Pete,	" " " "	12.75	25.50	4.25	2.75
Bute,	" 19, " 6 P.M.	14.50	30.50	6.00	4.25
Topsy,	" " " "	14.75	31.00	6.00	4.13
Pete,	" " " "	13.75	29.00	5.00	3.50

<i>Name.</i>	<i>Date.</i>	<i>Length.</i>	<i>Extent.</i>	<i>4th Primary.</i>	<i>Tail-feathers.</i>
Bute,	June 25, 1893 3 P.M.	16.00	34.50	7.50	5.25
Topsy,	" " " "	16.50	35.50	7.50	5.25
Pete,	" " " "	15.25	32.50	6.75	5.00
Bute,	July 1, " 5 P.M.	17.00	36.00	8.00	6.25
Topsy,	" " " "	17.50	36.25	8.25	6.57
Pete,	" " " "	16.25	34.75	8.00	6.25
Bute,	July 9, " 7 P.M.	18.00	38.00	9.25	7.50
Topsy,	" " " "	18.00	38.50	9.25	7.50
Pete,	" " " "	17.00	35.50	9.00	7.00
Bute,	July 16, " 5.30 P.M.	18.25	41.00	10.00	8.00
Topsy,	" " " "	18.50	41.00	10.00	8.00
Pete,	" " " "	Dead			

¹ Measurements in inches.—These measurements, made at intervals as above, are as nearly accurate as the temper and strength of the Hawks would allow.

GROWTH PER DAY IN INCHES.

	<i>Number of days.</i>	<i>Length.</i>	<i>Extent.</i>	<i>4th Primary.</i>	<i>Tail-feathers.</i>
Bute,	{ June 13-14.	.38	.50	.38	.25
	{ " 15-16.	.38	.75	.38	.25
	{ " 17-19.	.33	.67	.16	.25
	{ " 20-25.	.25	.67	.25	.16
	{ " 26-July 1.	.17	.25	.08	.16
	{ July 2-9.	.13	.25	.16	.16
	{ " 10-16.	.23	.43	.11	.07
Topsy,	{ June 13-14.	.38	.25	.19	.31
	{ " 15-16.	.50	1.00	.19	.19
	{ " 17-19.	.33	.83	.42	.28
	{ " 20-25.	.28	.75	.25	.19
	{ " 26-July 1.	.17	.12	.13	.25
	{ July 2-9.	.06	.13	.13	.29
	{ " 10-16.	.07	.08	.11	.07
Pete,	{ June 13-14.	.38	.50	.50	.25
	{ " 15-16.	.50	1.00	.12	.25
	{ " 17-19.	.33	1.06	.12	.12
	{ " 20-25.	.25	.58	.29	.25
	{ " 26-July 1.	.16	.58	.21	.21
	{ July 2-9. ¹	.09	.09	.12	.09
	{ " 10-16. ²				

¹ Sick.² Dead.

AVERAGE GROWTH PER DAY.¹

<i>Days.</i>	<i>Length.</i>	<i>Extent.</i>	<i>4th Primary.</i>	<i>Tail.</i>
June 13-14.	.38	.50—	.38—	.25+
" 15-16.	.50—	1.00—	.62	.25+
" 17-19.	.33	1.00—	.25+	.25—
" 20-25.	.25+	.67	.25—	.20+
" 26-July 1.	.16+	.25+	.16	.20—
July 2-9.	.12+	.25+	.12+	.12
" 10-16.	.16+	.25+	.12+	.06+

Of course these figures ought not be taken as absolutely accurate, on account of the difficulty of obtaining anything approaching accuracy. It is hard even for two people to measure a biting, screaming, struggling, clawing Hawk, even under the most propitious of circumstances.

When I first disturbed my 1889 Hawks, they were very vociferous and screamed loudly, just as their parents often do; but when I first got my 1893 Hawks they were very quiet and retiring, only peeping occasionally, and keeping their heads down, and if possible under each other, or in the corner of their box. They did this for several days, until they had gotten used to me, and for some time later, if they were scared in any way, they would turn about with their heads low down and pointed away from me at the corner of their box.

The first day I procured them I put them in a soap box, perhaps half full of hay, and placed it on a shelf in front of an open window in a room in my barn. I was careful for some time about their temperature, and opened or shut the window or covered their box with a blanket, as the weather seemed to warrant. For the first twenty-four hours they absolutely refused to eat of their own accord, and I was forced to stuff their crops full of raw beef, cut up for the purpose, three times a day. However, on the 13th of June, the second day I had them, both Bute and Topsy seemed glad, occasionally, to pick pieces of meat out of my hand, though I still had to stuff Pete's crop.

¹ This table shows approximately the average growth per day of the three Hawks during the time given in the first column, the measurements being taken on the last day on each line.

Pete was not averaged into the last two lines, as he was at first sickly, and slow of growth, and then died.

The sign — means less than; and the sign + means more than.

Both Bute and Topsy were very quiet at first, Topsy particularly so, but Pete was both active and noisy, and gave me a fair idea of what he was going to turn out to be.

June 15 I was surprised in the afternoon to find Bute seated upon the edge of his box philosophically considering the landscape outside his window. How he managed to get there I do not know, for though the oldest and strongest of the three, he was still too weak to stand more than a minute at a time. I then concluded to take them out of the box, both because Bute could climb out of the box himself, and also because the box was fast becoming very dirty, on account of their copious evacuations which were kept about them by the high sides of their box. So instead of a box, I made them a nest of hay, on the shelf, which would allow of their getting up and walking around, and which was more cleanly and airy.

Their method of evacuating was most interesting, showing as it did, their manner of keeping their nest comparatively clean without aid from their parents.

They would invariably turn their heads towards the centre of their nest, and, elevating their tail ends, would project their droppings with a forcible and audible sound, several feet away from the nest. I measured the distance to several that had fallen on their shelf over four feet from their owner, and some on the floor, which was eighteen inches below the shelf, were over six feet from the edge of the nest.

As the birds grew older, and were able to sit upon their perches, their evacuations became less forcible, less frequent, and less copious.

On June 16 I concluded to feed them but twice a day, instead of three times, as they were often obstinate about taking their food and required stuffing, and I judged that a little wholesome hunger might do them good.

They had, in the last four days, not only grown feathers so fast that you could almost see them grow, but they had also become much stronger on their feet, and livelier generally. Bute, as may be seen by the diagram, was almost covered with feathers, and Topsy and Pete were following along just two days behind relatively as to their growth and plumage. It was at this time that Bute grew the fastest, while Topsy and Pete reached their

maximum rates of growth a little later, and from this period of maximum growth they all gradually fell back a little at a time, until I went away from them on the 16th of July.

On June 20 I made up my mind that Bute was getting to be quite a bird. She had on several occasions objected to being fed, thinking perhaps she was too old for such childishness, and on this day she utterly refused to eat at all, when I held out food for her to take; and bit and screamed and clawed frightfully when I attempted to force her to swallow. I finally had to give in and concluded to let her go hungry.

I built some perches, this day, and on placing Bute on one of them was surprised to see her flop off, down to her nest about fifteen inches away; she was evidently beginning to learn the use of her wings, and would also spread them when she ran up and down her shelf; she was also learning how to look angry, for upon my bothering her in any way, she would raise her head and back feathers and extend her wings in a drooping position, looking very fierce, even at that early age.

On June 21 I found that Bute had concluded to eat for herself, for several pieces of meat that I had left on her plate the day before had disappeared, and were only accounted for by a noticeable swelling in her crop. I caught her later in the same day, with a piece of meat under her foot tearing and eating it in a very ferocious and independent manner.

Topsy and Pete still ate as usual, and seemed little inclined to follow in Bute's footsteps. From this time Bute seldom would take anything from my hand and absolutely refused to be stuffed, and so either fed herself or went hungry.

On June 25 I noticed that Topsy was rather getting ahead of Bute in size, and I could not help inferring that this relative change might be directly referable to Bute's independence on the food question, and the result of consequent lack of nourishment on her part.

June 27 I took Topsy for an airing. I chose her because she was most tractable. Bute felt her oats too much and was too wild and lively, while poor little Pete, with his ugly, noisy disposition was still too weak on his legs to allow of much running about. At first I carried Topsy on my fore-arm, but finding that my sleeves were not impervious to her very sharp talons I con-

cluded to carry her on a short stick instead. I took her out on the lawn, and upon putting her down, she sat still for a few minutes, and then spreading her wings gave a series of long flopping hops; then she sat still for a time, apparently wrapt in thought. Her first appearance having been noted by several birds in the vicinity, she had by this time plenty of food for thought, and plenty to look at too. A very saucy Blue Jay had started the racket, and he had been backed up immediately by lots of Robins, English Sparrows and 'Chippies,' and by the time she had gotten through hopping, Orioles, Grosbeaks, and even one little Least Flycatcher had joined in the mob, and if Topsy moved in any way except to turn her head, she was immediately assailed by a dozen different birds from as many directions. She, however, except to watch them occasionally, appeared to pay but little attention to them. From this time on I took her out as regularly as possible, not only to exercise her but to watch her and the antics of the mob that invariably followed. She became a great pet, never behaving badly in any way, and was always ready to eat from my hand if I offered her anything, though she was perfectly well able to help herself to food whenever she cared to.

Bute continued to be independent and untamable, and both she and Topsy could fly around their room, from perch to perch, in very good style by the end of June.

Pete, however, remained incorrigible; he seldom if ever ate by himself, and would hardly ever eat from my hand, and invariably resented being stuffed. I remember particularly one tussel I had with him on the first of July. He was very ugly, and I tried what slapping his head would do, as discipline. He screamed fearfully, so much so that some of the neighbors came in to see what the matter was. He bit my finger and tried his best to claw me, striking at me with his feet. He erected his head, neck and interscapular feathers, and even ruffled his breast feathers and drooped his wings. This last was the sign of extreme rage, and his position for active defence.

I took Topsy out as usual, on July 1, and though she had all the usual mob of birds around her, there were also a couple of Vireos, a Golden-winged Woodpecker, and a couple of Blue Jays, that seemed particularly active in the assault. The Woodpecker approached very close to her, and the Blue Jays actually flew

against her head, trying seemingly to pick her eyes out. I noticed, too, that upon the appearance of the Blue Jays, the smaller birds seemed to pay much more attention to them than to Topsy. I gathered in one of the Jays, and wounded an English Sparrow which I took up to the Hawks' room and introduced to Bute. Bute had never in her life seen a live bird. Nevertheless, as soon as the Sparrow attempted to flutter across the room, it had not gotten two feet before Bute had swooped down upon it from a high perch, in the most approved Hawk fashion. She grabbed it with both feet, and upon my retiring to a distance, proceeded to tear the feathers from off its neck and eat that portion of its anatomy. While doing so, she showed up her importance to the best of her ability by erecting or extending each and every feather she had, even her tail being spread to its fullest breadth, and her wings drooping down on each side of her till they touched the shelf on which she stood.

Topsy had for some time been catching up with Bute in cleverness, as well as growth, and on July 2, when I gave her a piece of the meat that was too big for her to eat whole, she took it in her talons and tore it with her beak. Pete, too, had been caught lately feeding himself out of the plate in which I usually kept their food, so I now felt relieved of the responsibility of feeding any of them, except for pleasure.

On July 7, although Pete had been feeling pretty well all the week, and although he was still growing, though perhaps not so fast as his sisters, I decided to gather him to his fathers. He had been growing weaker and weaker, and was hardly able to stand, much less to walk. When he tried to stand it was pitiable to see him; a sort of creeping paralysis seemed to have seized him. So I put a pistol ball mercifully through him and ended his ugly, noisy, contrary existence.

On this same day I was compelled to clip one of Topsy's wings; she had caught the trick of late of flopping from branch to branch, up any tree that came handy, and it had become only a question of time until she should get up so far that I could not get her down, or until she should fly away entirely.

On July 16 I went away for the summer, and, I am sorry to say, bade good-bye to my Hawks forever. They had the best care that my family could give them, but in spite of this they both died

before I returned in the autumn, and apparently of the same disease which sickened Pete. Bute died about three weeks after my departure, and Topsy about three weeks later. I was sorry to lose Bute for I valued her, but I was really sad at Topsy's demise—she had been an admirable pet from beginning to end, always quiet and docile, with all the virtues and none of the vices of her brother and sister, and she had become quite a companion.

Of course their food (they lived entirely on raw beef except a very occasional sparrow) probably did not agree with them, but I lay the cause of their death more to their want of freedom, and consequent lack of exercise. Pete was too young perhaps when I took him, and on account of his contrariness did not get the advantages the others did. He got no exercise whatever, and sickened long before the others showed any unhealthy signs. Bute was intractable, and though she could fly around a room and get some exercise that way, she seldom did. Topsy, on the other hand, got more or less of open-air freedom, and I feel sure would have lived had I been home to take her out.

In ending I would suggest that if any one wants more accurate data obtained under more natural conditions than the above, they should find some Hawk's nest of easy access, and climb up to it each day for regular data. I leave this task to some one else, however, as I have neither the time nor the patience.

BREEDING HABITS OF THE KING PENGUIN (*APTENODYTES LONGIROSTRIS*).

BY R. G. HAZARD.

Plate VIII.

IN 'BULLETIN No. 2' of the United States National Museum (p. 41), Dr. J. H. Kidder mentions a curious habit of the King Penguin (*Aptenodytes longirostris*) upon the authority of Captain Joseph J. Fuller. He says: "Captain Fuller, of the schooner Roswell King, informs me . . . that they [the King